

Production Capacity and Queues in a Bookstore at Porto Velho, Brazil

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Abstract—The objective of this work was to study the productive capacity and queues in the services of a bookstore in Porto Velho city, Brazil. To do this, the specific objectives were: (1) to study the productive capacity in the operation units of the bookstore; (2) to carry out an analysis of queuing and flow management in the operation units of the bookstore; and (3) to suggest prospects for the development using the SWOT Matrix analysis tool.

Keywords—Production capacity, queues, bookstore, SWOT matrix.

I. INTRODUCTION

This paper deals with the operations of production, storage, logistics and queuing in a bookstore at Porto Velho city, state of Rondônia, Brazil. It focuses on practices to exemplify the innovative ideas that this business segment brings in the research scenario, being a pioneer in the traditional services of this segment.

Thus, in this work, we exemplified the operations capacity of buying and selling books, which reflects the basic production activity of this company. The practices that generate value for the company are identified analyzing the production plant and operations. In the case of commercial relations of purchase and sale, production is a non-peculiar traditional activity compared to industries and other organizations which transform raw materials and other inputs into finished products.

Based on a case study and mapping of common practices that make this company a success within the Porto Velho city and in this segment, we discuss the kinds of organization in which its production process is presented (book marketing). We also analyze these operations using

the five items of the production function as a tool. The data were provided by the company itself, which was receptive and ready to collaborate on this work.

II. OBJECTIVES

The general goal of this research is to study the productive capacity and queues in operations network units in the bookstore service plan. For this purpose, the specific objectives are (1) to study the productive capacity in the service plan of a bookstore, (2) to perform the queue and low management analysis in the operation units of the bookstore, and (3) to suggest the development perspective using the SWOT matrix analysis tool.

III. THEORETICAL-CONCEPTUAL REVIEW

In Corrêa & Corrêa (2013) is argued that all organizations which process flows (people, materials or information) and which are subject to some restriction of the capacity of resources, face, in one way or another, the waiting queues problem. If they are material flows, the waiting queues are called as stock in process (or stock awaiting processing). If they are people flows, they are the unfriendly queues we get used to living as clients, in many service operations.

In this work, we seek to define the productive capacity and the queues in the operation units of a bookstore in Porto Velho. In this section we first outline the concepts of productive capacity; then queuing and finally, the concept of the SWOT Matrix as a productive tool to assist in strategic planning.

3.1 Production capacity in operations units

Managing productive capacity is a challenge that has a high impact on company strategies. This challenge involves some primary types of decisions since it draws in large sums of invested capital. Therefore, it is considered as basic importance. This large amount of capital invested may be due to the cost of millions in developing an innovation or even copying production management models or operations that already exist.

These decisions about changes in the productive capacity system can take a long time. Therefore, it is interesting that these operations capacity management activities are allied to the challenges posed in the strategic planning of the companies. A mistaken decision on productive capacity has a direct impact on the operational performance of the production unit. In this way, any unplanned change in the mode of production can cause problems and inconveniences that, if not corrected in time, can cause great financial or even productive losses. The activities related to the production of a good or service are often quite distinct because of the specificity of goods and services.

According to Bolanho (2016), predicting demand is the first step in getting a sale forecast as close to reality as possible, and it is known as a process ordered by the search of information regarding the value of future sales of a product or a batch of these products.

3.2 Queues in operations units

In Fogliatti & Mattos (2007) is asserted that the waiting queues for service are part of the daily lives of individuals in modern society, and since they cannot be avoided, they tend to be tolerated, despite the delays and inconveniences they cause. However, queuing processes can be studied and scaled to a reduce the losses in time and productivity, as well as the financial losses they entail. Another aspect of most real queuing systems is the use of a particular criterion for customer service, determining that the first customer to call when a server becomes available is the first customer in the queue (the service is done on a first come, first served basis).

For Corrêa & Corrêa (2013), practically all the organizations that process flows (of people, materials or information), and are subject to some restriction of a capacity of resources, face the waiting queue problem. Also, according to the author, one of the most important queuing management tools is simply changing the type of system.

In Fogliatti & Mattos (2007), a queue system is defined as any process in which users from a given population arrive to receive a service that they expect, leaving the system as soon as the service is completed. This waiting happens when the demand is greater than the offered service capacity, in terms of flow. Thus, a queue system is composed physically by users, channels or service stations

and a space designated for waiting. In Fig. 1 we synthesize this process.

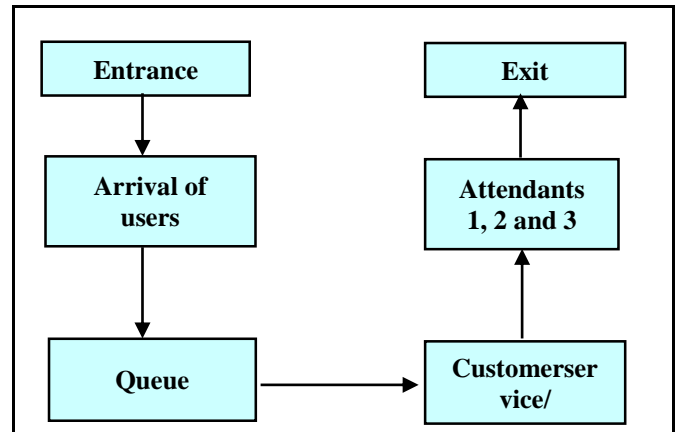


Fig. 1: Schematic representation of a queue system.

Source: Prepared by the authors

In this way, organizations have the mission to define the number of their service stations. In Fogliatti & Mattos (2007) is warned that the excessive number of service stations can produce high management costs, which, if passed on to users, can make the service unfeasible, even with the advantage of waiting for a short time for it. However, few service stations cause user dissatisfaction, which usually leaves the system if has another option because he/she does not support an excessive waiting time.

3.3 SWOT Analysis as a strategic planning tool

The work of Nogueira (2016) indicates that organizations are created to achieve goals, which suggests the significance of business purpose. However, as several of them are created to achieve similar goals, this results in competitiveness in the place where they act. This author defines strategy as the process that an organization defines what and how to reach. As competition is the dispute for common goals held by two or more individuals or organizations, which requires analyzing performance scenarios, both internal and external.

The term SWOT is an acronym for strengths, weakness, opportunities, and threats. These four points should be identified, analyzed and related to each other. SWOT analysis is an instrument used in the strategic planning of companies, allowing the environment to be defined, identifying its four points. Fig. 2 illustrates how these points should be identified, analyzed and interrelated and Table 1 describes each element of the matrix.

| | | |
|----------------------|---------------|----------|
| External Environment | Opportunities | Threats |
| | Strengths | Weakness |

Fig. 2: SWOT matrix elements. Source: Prepared by the authors

Table 1: SWOT matrix elements – description. Source: Prepared by the authors based on Nogueira (2016).

| Elements | Description |
|----------------------|---|
| Strengths | Positive and internal elements of the organization: These elements are part of the internal environment of the organization and concern the factors that increase their market share and create their competitive differential. |
| Weakness | Internal and negative elements of the organization: These elements are part of the internal environment of the organization and concern the factors that decrease their participation in the market and part of their competitive differential. |
| Opportunities | External and positive elements of the organization: These elements are part of the external environment of the organization and concern factors which may add their market share and improve their competitive differential. |
| Threats | External and negative elements of the organization: These elements are part of the external environment of the organization and concern factors which may hinder their market and to remove part of their competitive differential. |

IV. METHODOLOGY

According to Bastos (2016), scientific research leads to the search for new knowledge. Thus, it converts the academic experience of the researcher into applied knowledge through written work and initiates the practice of the search for scientifically grounded results. Scientific research has been modified in recent years due to many factors, both those resulting from itself and from technological development, as well as from other factors of a political, educational, social and economic order. The main purpose

of science lies in the pursuit of knowledge that is produced through research.

The method of scientific research used in this study was the case study method, treated in Cavalcante Lima et al (2012). These authors affirm that a case study justifies its importance by gathering numerous and detailed information that makes possible to learn the totality of a situation. The richness of the detailed information helps the researcher in a greater knowledge and in a possible resolution of problems related to the studied subject. Thus, the case study as a research strategy comprises a method that covers everything, dealing with planning logic, data collection techniques and specific approaches to data analysis.

Therefore, in this research, besides the case study, we carry out a bibliographic review, query websites of universities and other specialized scientific knowledge institutions, technical interview, and technical visit. From these research tools, we organize and relate the data organization procedure and the formulation of the academic work. Fig. 3 presents the pipeline of the research, and each step is described as follows.

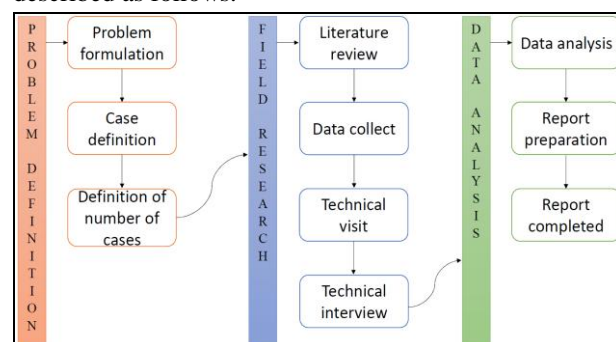


Fig 3: Design research pipeline. Source: Prepared by the authors.

Problem formulation: Definition of the topic to be explored and the problematic to be answered; initial phase in which an academic research opportunity is identified about a research problem.

Case unit definition: Choice of the operation and production unit to be analyzed; subsequent phase in which an operation unit is identified, and the research problems related to the topic will be worked out.

Determination of the number of cases: Determination of the cases or themes to be addressed within the case unit; selection of which cases will be worked on the research project, that in this case, corresponds to the three specific objectives of this research.

Literature review: Reading and research of scientific and specific material on the subject; reading of all the bibliographical information pertinent to the subject to be exposed.

Data collect: Collection of all relevant information; phase in which the data were separated from the bibliographic

review and then, the selection of the readings that are referenced in this research was made.

Technical visit: Location and observation of the place of analysis of the case study; subsequent phase in which, after identifying the topics to be worked on in the research, the collection of these data is carried out *in loco*, that is, we go to the field to find the actions regarding the data selected in bibliographic research.

Technical interview: Specification of the problem and confirmation of the data by the company; the last phase of data collection within the company. At that moment, an employee of the company should be interviewed and answer all the questions that the researcher considers pertinent and confirm the research problem with the researcher.

Data analysis: Organization and analysis of all the research material; in this stage, the data collected during the visit and interview phase will be organized and analyzed and the results will be compared with those found in the literature.

Preparation of the report: Elaboration of the scientific work; scientific work will now be better established, and all the approaches that the authors of the research have used will be written. In this case, we opted for the qualitative approach of academic work, with the bibliographic review being evidenced by the results of the field research.

Report completed: Scientific-technical report already concluded; here is the conclusion of the academic work. From here, the work is ready to be presented to the scientific community and to give feedback to the company.

V. STUDY OF PRODUCTIVE CAPACITY AND QUEUE IN UNITS OF THE OPERATIONS NETWORK IN A BOOKSTORE IN PORTO VELHO CITY

The work was carried out in a bookstore located in Porto Velho, capital of the state of Rondônia, Brazil, in which the administrative manager presented the production capacity and the processing of operations within the bookstore. In this demonstration, she commented on the ability to acquire new merchandise, the company's discount policy that makes it the Rondônia state's leader, and also a sales promotion policy of the company that is part of the operating processes. The bookstore is a branch in Porto Velho that was inaugurated in 2013 within Porto Velho Shopping, where it has since increased its production role, buying more merchandise and increasing the number of book segments in which the company operates, from scientific segments and romantic, even religious and culinary.

The company diversified its operation into the stationary and informatics segments. According to data collected from the own magazine of the bookstore, a special edition

of June 2017 – Year 12 – n. 94 in commemoration of the 50th anniversary of the opening of the first bookstore in the country – it began as a sebum of magazines and used books, becoming the first its own headquarters in Belo Horizonte – MG, Brazil, in 1967. Since then, the company has started the project to open branches throughout the country, acting as book publisher and source of wealth for entrepreneurs who become partners in the most varied states of the country.

In Ferreira (2016) is conceptualized the production capacity as the maximum quantity of products that can be obtained, or produced, by a given productive unit over one period on time. In this way, it is not possible to visualize an increase or decrease in the capacity of operations in the company, since most of the year they are constant. However, the volume of sales is higher each year, according to data provided by the company's administrative manager, and it shows a peak in demand for school materials through its stationery operations in January, July, and December due to demand materials low-priced and affordable local schools within Porto Velho Shopping.

5.1 The productive capacity in the operation units of the bookstore

According to Ferreira (2016), it is possible to define productivity in function of the results coming from the resources made available for the production, and consequently, its efficiency. The company presents a system of payment transactions of suppliers denominated system of the consignment of payments. This system refers to the way in which the company trades its goods so that it only pays for the products that are marketed. These practices generate productivity in their results, avoiding financial fixed assets with stock, which brings efficiency in the results, which is consistent with the author's assertion.

The bookstore also has a minimum stock system, ordering books that the customer wants. This is an innovation with respect to the market that the company wants to achieve, because the target audience, students, and writers who are interested in writing in general, may wish other products that are related to the pleasure of reading.

The company started the commercialization of imported collections of magazines and anime collectors, with the system of ordering products on demand. Thus, the innovation comes with the prompt attention of the customers to the new products that the company offers, diversifying its characteristic form of being a reference bookstore in Porto Velho.

In addition, the bookstore entered into the commercialization of computer equipment as well as school t-shirts. The t-shirts are made when ordered by the schools, from a certain number of requests.

In this way, the productive capacity and the operations of the company are carried out through the high-level sales processes and its operations, which are the purchase, the stock supply, merchandise replenishment and sales effectuation. These factors make the company defined as productive since it presents operations at high levels.

This bookstore attends the productive system proposed by the literature on production management. Its productive capacity has a maximum volume of operations, which corresponds to high-level sales, continuous supply of new products and a minimum stock system when restocking. It is in line with the prescriptions in Ferreira (2016). The Fig. 4 shows the processing operations in the bookstore and Table 2 describes each one of these operation steps.

Table 2: Processing operations in the bookstore – steps description.

| Type of element | Process specification |
|-----------------|--|
| Stock | Storage: supply the company with the materials that arrive. |
| | Addressing: insert the destination for new orders. |
| | Supply: Receipt and control of new stocks |
| | Inventory: Stock control system |
| | Purchase requisition: Requests for new purchases |
| | Purchase Order: List the most important orders |
| Purchase | Budgets: Check how much each purchase is going to cost. |
| | Quotes: Compare prices between suppliers. |
| | Contracts: The legal instrument that regulates the purchase. |
| | Requisitions: Ask the financial sector for new purchases. |
| | Registration of Entries: Registration of incoming goods. |
| | Receipts: Receive the new goods. |
| Sales | Sales Planning: Sales Strategy for goods |
| | Marketing Research: Evaluates the profile and the desire of the consumer. |
| | Customer reception: Customer service and directions by sellers |
| | Closing and business implantation: Process that receives the payment. |
| | After-sales follow-up: monitoring and suggestions to customers. |

Source: Prepared by the authors



Fig 4: Processing operations in the bookstore. Source:

Prepared by the authors.

5.2 Characterization of the queuing system in the operations units of the bookstore

According to Corrêa & Corrêa. (2013), in a single-queue single-stage system the flow elements arrive in a single queue in which wait until their turn comes to be answered. The first server available will be the one to make the service. Queues should be formulated to facilitate the incremental handling of value delivery to customers. This should occur through fast service and at the same time generate advantage as to the discrimination between the size and quantity of items that a customer enters to pay within a marketing unit. In our case, it is used to favor prompt customer service. Operations also take place at the exit level of operations that are enhanced by the formation of queues that must best meet the customers' desires, to facilitate their accommodation and obtain their satisfaction.

For Fogliatti & Mattos (2007), the waiting time in a queue, related to the number of products that the user must pass, can represent a factor of success or failure of his satisfaction with the company. This is what we call the psychology of the queue.

In this company, the queuing system provides fast customer service. A single service queue is formed so that customers are quickly served, with fewer queuing times remaining. This provides a decrease in customer dissatisfaction with the company. The client's emotional dissatisfaction can lead to a decrease in his/her perception of the quality of the company, to disregard the quality of internal processes and service, thus reducing his interest in returning to it. Thus, it is demonstrated that the queue system of the analyzed company is compatible with the literature on queues.

It is very important for this bookstore the rapid attendance and the decrease of the waiting time of the customer for service, from the indication of books available for sale until the indication of where they are located in the store. So, when the customer arrives in the store and immediately sees what he/she wants, this tends to decrease the likelihood of their dissatisfaction with the bookstore. In

addition to the physical disposition of the goods, the sellers are also advised to find out what the customer really wants, making immediate access to their search available.

The customer service system consists of four cashiers, in which occurs the service transaction, registration, discounts and the sale of the product. This single queue system is presented in Fig. 5 and the description in Table 3.

The single queue system or single-stage queue system in which customers arrive to be served in a single stage is the best for this company, since the number of customers is stable for most of the year, and there are no significant spikes to impair the quality of customer service.

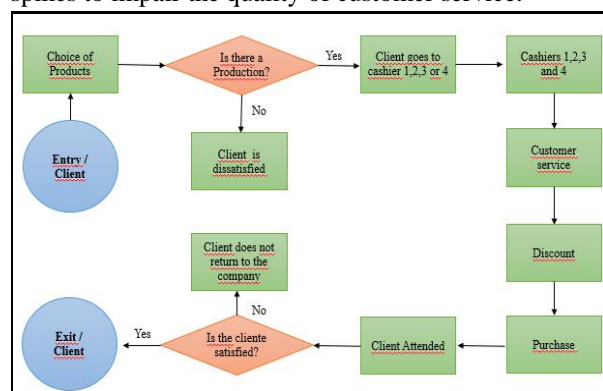


Fig. 5: Queue system of single-stage. Source: Prepared by the authors.

Table 3: Single-stage queue system in the company.

| Queue system element | Description |
|-------------------------------------|---|
| Entry- Customer- Loyalty | Customers form a single queue in which they take the products already with the seller's file that aided them in the sales process. |
| Cashier | They are arranged in a workbench with 4 places where they perform fast service for clients and make the client registration, exchange of points in the acquisition of books by discounts on the purchase of new merchandise of the company. |
| Customer- Exit- Satisfaction | Customers have a positive image of the company, receive their product with the possibility of exchange in case of defects in the books or other products, or even in the case of gifts bought wrong. Then, they leave the company. |

Source: Prepared by the authors

According to Nogueira (2016), knowing the market in which it operates and at the same time knowing itself makes the company more competitive and ready to face the challenges of competition and overcome its own internal challenges within the market. The SWOT matrix is a tool for companies' self-knowledge as well as factors external to it, which can generate positive challenges, such as increasing demand or lowering prices in front of a new competitor. Thereby, from the analysis of the bookstore's SWOT matrix, it was possible to notice the opportunities, disadvantages, strengths, and weaknesses of the Porto Velho branch. In Table 4 is presented the SWOT matrix analysis according to the literature review of SWOT matrix and Administration.

Table.4: SWOT Matrix of the company.

| SWOT Element | Specification |
|----------------------|---|
| Strengths | Attendance: Receive and inform customers. |
| | Climatized Environment: A refrigerated physical environment where operations take place |
| | Forms of Payment: Various possibilities for the customer to pay for the purchase. |
| | Family Environment: Calm, quiet, safe and pleasant environment. |
| | Product Organization: Products layout inside the store. |
| | Title Varieties: Diverse segments that the company offers of products. |
| | Location: Place where the company is installed (at Porto Velho Shopping). |
| | Customer Loyalty Program: Coupons that will be redeemed for discounts. |
| Opportunities | Partnership with publishers: Products of the bibliographic material of reference. |
| | Shopping Disclosure: Disclosure by Shopping's advertising programs. |
| | Increase in purchasing power: Increasing consumption of books and others. |
| Weaknesses | Low Disclosure: The company does not invest enough in disclosure |
| | Not so Affordable Prices: The prices are the same as the internet. |
| Threats | Competitors with more affordable prices: They offer good prices but decline in variety. |
| | Internet selling: Threats that take the number of sales of the company |

5.3 SWOT Matrix analysis of production capacity and queues in the bookstore

| SWOT Element | Specification |
|--------------|--|
| | Development of e-books: Non-traditional mechanism of reading books. |
| | Undue reproduction of books (photocopy): Copies without authorization to read. |

Source: Prepared by the authors

Regarding the internal environment, Albuquerque et al (2017) states that the analysis of Strengths and Weaknesses deals with manageable internal factors. That is, from the moment the company knows its strengths, it can work to maintain and make those points stronger each day. And knowing the weakness can take the necessary actions to correct and to avoid them.

The analysis of the external environment, which refers to Opportunities and Threats, deals with factors external to the organization, and there is no way to manipulate them directly. However, the company should not let to monitor opportunities and threats. Once the company knows the opportunities of the environment in which it is inserted, it can act proactively to take advantage of these opportunities. In addition, by knowing the main threats of the scenario where it is inserted, it can act to minimize risks and prevent these threats from affecting its results.

VI. CONCLUSION

Operations occur in all organizations, whether in the service area or in the production and marketing of products. The productive capacity of the company analyzed increased significantly since its installation in Porto Velho in 2013. This was possible due to the combination of good management practices and the know-how of the founding partners of its parent company, permeated by the culture of the partners who inaugurated the subsidiary of Porto Velho. The increase in productive capacity occurred when the company began to invest in evaluations of itself of its market action. The forecast of demand served to increase the number of goods purchased and to better know the likes and profile of its customers. In this way, she added new book segments to her activities. This led it to add new segments of books to its activities.

The sale operations are a competitive advantage of the company in the city of Porto Velho, and this has been demonstrated in this work through the promotions, discount policies that the company offers to its clients, and after-sales follow-up. Therefore, the bookstore is prepared to face the competition that may arise in the city.

The single-row system used proved to be suitable for the environment with a layout that facilitates the internal movement of the clients and while it directs them to a fast service in the moment of making the payment of their

merchandise. Because customers form a single queue at the time of payment, they are immediately directed to four boxes that promptly answer them and inform them of the promotions, rights, and guarantees the company offers to its customers. Hence, this system proves to be effective and satisfactory for both the client and the company.

An in-and-out analysis of the organization was demonstrated in this work through the help of the SWOT matrix tool, which identified the significant factors that the organization must reinforce, improve and increase among its practices.

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